

REMARKS

Claims 1 and 4 are now pending in the application. Claims 1 and 4 stand rejected. Claims 2-3 and 5-16 are withdrawn from consideration. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the remarks contained herein.

INTERVIEW SUMMARY

Applicants thank the Examiner for the Interview on March 11, 2010 with Applicants' representative. The Examiner and Applicants' representative discussed potential claim amendments, similar to those presented here, and the cited references. The Examiner and Applicants' representative also discussed the improved sensitivity for controlling fuel cell humidification of the present teachings. Applicants have provided a Declaration of the inventor Steven Falta as discussed in the interview. No agreement was reached on the allowance of the claims.

REJECTION UNDER 35 U.S.C. §§ 102/103

Claims 1 and 4 stand rejected under 35 U.S.C. §102(b) as being anticipated by DiPierro Bosco et al. (U.S. Patent No. 6,103,409). This rejection is respectfully traversed.

At the outset, Applicants have amended claim 1 to recite a fuel cell with computer comprising "a collection of the set of differential pressure signals measured during operation of the fuel cell" and further comprising a system controller having executable logic for generating a set of differential pressure signals and determining a root-mean-

square value from "only said collection of the set of differential pressure signals" to control the vaporized water source.

Rejection Under §102 – DiPiermo Bosco et al.

Applicants respectfully assert that the DiPiermo Bosco et al. patent does not anticipate Applicants' claims because the DiPiermo Bosco et al. fuel cell provides only a *priori* data collection. Applicants respectfully point out that the data form a part of the fuel cell system. The DiPiermo Bosco et al. patent requires that the fuel cell system include data from pre-measured pressure drops at every combination of flow and electrical load conditions expected to be encountered during fuel cell operation in order to establish the predetermined thresholds of unacceptability. See the first box in Fig. 2 and Column 5. The DiPiermo Bosco et al. patent and data/fuel cell combination is wholly distinguishable from Applicants' claimed invention which explicitly includes "a collection of the set of differential pressure signals measured during operation of the fuel cell" and a system controller having executable logic for generating a set of differential pressure signals and determining a root-mean-square value from "only said collection of the set of differential pressure signals" to control the vaporized water source -- without reliance on an *a priori* data set. There is no anticipation by the DiPiermo Bosco et al. patent.

Rejection Under §103 Based on DiPiermo Bosco et al. and Secondary Considerations Including a Declaration of Steven Falta

With respect to the §103 rejection, the Office Action points to no reason from the DiPiermo Bosco et al. disclosure, or elsewhere in the prior art, to modify the DiPiermo

Bosco et al. fuel cell with Applicants' control of fuel cell humidification. Applicants' root-mean-square calculated during fuel cell operation is different from the DiPiermo Bosco et al. comparison to pressure drop in an unflooded reference stack. Applicants' parameter is based on the statistical value, root-mean-square, determined from the executable logic based on a "collection of the set of differential pressure signals of the fuel cell." Applicants' claimed fuel cell stack which includes the data is thus patentable over the DiPiermo Bosco et al. patent disclosure.

Moreover, Applicants' invention offers unexpected benefits compared to the DiPiermo Bosco et al. system. Applicants' claimed invention can control humidification with no prior knowledge of unflooded stack pressure drops because Applicants' detection method considers only fluctuations about the mean pressure drop reading. Applicants' claimed invention provides sensitivity and speed of measurement which is not disclosed, taught by, or inherent in the DiPiermo Bosco et al. system which is limited to measurements based on the reference fuel cell.

The Declaration of Steven Falta, submitted herewith, further supports Applicants' unexpectedly improved speed and sensitivity of the claimed fuel cell. The improvements are best illustrated in that the pressure drop indication based on the differential fluctuations provides a reasonable steady-state condition after an elapsed time of only 100 seconds. Additionally, for example, Applicants' invention facilitates sampling at 10 Hz or greater which is much more amenable to automotive fuel cell operation where the dynamic load following operation rarely allows for greater than several minutes at a fixed load condition. Paragraph [0044]. Further, Applicants' system achieves a relatively steady state after 100 seconds. Figures 4 and 6.

In comparison, the DiPiermo Bosco et al. pressure drop indication attains a reasonable steady-state condition after an elapsed time of 1000 seconds. Figure 4 of DiPiermo Bosco et al. In this example, Applicants' claimed invention provides a 10-fold increase in speed and in sensitivity. Applicants assert that, even if a *prima facie* case of obviousness had been made, the unexpected results provide a secondary consideration evidencing patentability which Applicants assert weigh in favor of patentability and non-obviousness. See *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966); *In re Sullivan*, 84 USPQ2d 1034 (Fed. Cir. 2007).

Additionally, Applicants' claimed fuel cell provides "an accurate determination of the onset of flooding status and control" and "optimization of stoichiometry with a comparable optimization of air compressor capacity, efficient management of rapid power transits, and data for effective management of stack purge." Paragraph [0054].

As DiPiermo Bosco et al. do not disclose, teach, or provide a reason to make Applicants' claimed fuel cell system, reconsideration of the claims and removal of these rejections are respectfully requested.

Rejection Under §103 Based on DiPiermo Bosco et al. and Eryurek

Claims 1 and 4 stand rejected under 35 U.S.C. §103(a) as being unpatentable over DiPiermo Bosco et al. (U.S. Patent No. 6,103,409), as described above in view of Eryurek et al. (U.S. Patent No. 6,539,267). This rejection is respectfully traversed.

The Eryurek et al. patent uses stored (or trained) values and rules. Accordingly, the data is collected *a priori* for the system. Similarly, DiPiermo Bosco requires an *a priori* collection of data for the anode and cathode pressure drops at every combination

of flow and electrical load conditions expected to be encountered during fuel cell operation. Thus, the combination teaches an *a priori* collection of data.

In contrast, Applicants' fuel cell does not include an *a priori* collection of data and instead modulates the system using the claimed "controller having executable logic for determining a root-mean-square value from only said collection of the set of differential pressure signals." The difference in data collection between Applicants' system and systems such as those in the DiPierro Bosco et al. and Eryurek et al. references is what helps provide "an accurate determination of the onset of flooding status and control" and "optimization of stoichiometry with a comparable optimization of air compressor capacity, efficient management of rapid power transits, and data for effective management of stack purge." Paragraph [0054]. As stated above, the unexpected benefits of Applicants' claimed system, including the increased speed and sensitivity are detailed in the Declaration of Steven Falta.

Further, Applicants respectfully point out that the cited art fails to provide any guidance, instruction, or reason for a skilled artisan to modify the teachings of the DiPierro Bosco et al. and the Eryurek et al. patents and process controls to change the data set from which all controls are based to that of Applicants' claims. Such details are necessary for a case of obviousness. See *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006) ("[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning to support the legal conclusion of obviousness.") MPEP §2143 states that "[t]he key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious," which should be made explicit, as

directed by *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727 (2007). This burden is not met in the present rejection based on the combination of the DiPiermo et al. patent and the Eryurek et al. patent.

Accordingly, the combination of the DiPiermo Bosco et al. patent and the Eryurek et al. patent fails to teach or suggest Applicants' claimed invention. Reconsideration and withdrawal of the §103 rejection of the claims are respectfully requested.

Response to Examiner's Assertions Regarding Windows Operating System and Excel Software

With respect to the Microsoft Office Windows Operating Systems, the Examiner cites internet articles to support the proposition that Windows and Excel are on all computers and therefore, use of the root-mean-square calculation as claimed by Applicants is anticipated or obvious. Applicants respectfully assert that this is inadequate to support the §102/103 rejection for several reasons. First, Applicants respectfully remind the Examiner that there must be a reason to incorporate such a feature into the DiPiermo Bosco system; it is not sufficient that it merely lies in a universe of software.

Second, regardless of the software and computer system used, the DiPiermo Bosco et al. fuel cell and pre-loaded data is not a collection of dynamic data as measured during operation of the fuel cell, as claimed by Applicants. Applicants assert that no software provides such reason or motivation to modify a fuel cell to dynamically obtain data and only use the dynamically obtained data in the operational calculations.

Finally, the person of ordinary skill in the art could not have expected the astonishing increase in sensitivity provided by Applicants' claimed fuel cell stack, as described by Mr. Falta in his Declaration. Thus, even if the references were properly combinable to show *prima facie* obviousness, the evidence of unexpected results would overcome the showing.

CONCLUSION

Applicants believe that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider and withdraw all presently outstanding rejections. Applicants believe that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, Applicants request prompt and favorable consideration. If the Examiner believes that personal communication will expedite prosecution of this application, Applicants invite the Examiner to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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